

## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner  
US Department of Commerce  
United States Patent and Trademark  
Office, PCT  
2011 South Clark Place Room  
CP2/5C24  
Arlington, VA 22202  
ETATS-UNIS D'AMERIQUE  
in its capacity as elected Office

Date of mailing (day/month/year) 16 April 2002 (16.04.02)	
International application No. PCT/EP00/10185	Applicant's or agent's file reference P1999S007
International filing date (day/month/year) 17 October 2000 (17.10.00)	Priority date (day/month/year) 29 October 1999 (29.10.99)
Applicant COCHRANE, Heather, D. et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:  
23 May 2001 (23.05.01)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer R. Raissi Telephone No.: (41-22) 338.83.38
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# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>P1999S007</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/EP 00/ 10185</b>	International filing date ( <i>day/month/year</i> ) <b>18/10/2000</b>	(Earliest) Priority Date ( <i>day/month/year</i> ) <b>29/10/1999</b>
Applicant  <b>EXXONMOBIL RESEARCH AND ENGINEERING COMPANY</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☒ None of the figures.

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 00/10185

A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 7 C10L1/04 C10L1/08

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C10L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2 892 769 A (FRAZIER ET AL) 30 June 1959 (1959-06-30) claims 1-4	1-5
A	US 2 717 858 A (BRONSON ET AL) 13 September 1955 (1955-09-13) claim 5 example I	1, 2, 4

☐ Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

## ° Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*&\* document member of the same patent family

Date of the actual completion of the international search

16 February 2001

Date of mailing of the international search report

23/02/2001

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
 NL - 2280 HV Rijswijk  
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
 Fax: (+31-70) 340-3016

Authorized officer

De Herdt, O

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/EP 00/10185

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US 2892769	A	30-06-1959	NONE
-----			
US 2717858	A	13-09-1955	NONE
-----			

# PATENT COOPERATION TREATY

From the RECEIVING OFFICE

# PCT

To:

Dew, Melvyn John  
EXXONMOBIL CHEMICAL EUROPE INC.  
P.O. Box 105  
B-1830 Machelen  
BELGIQUE

NOTIFICATION OF THE INTERNATIONAL  
APPLICATION NUMBER AND OF THE  
INTERNATIONAL FILING DATE

(PCT Rule 20.5(c))

Date of mailing  
(day/month/year)

13. 11. 2000

Applicant's or agent's file reference  
P1999S007

IMPORTANT NOTIFICATION

International application No.  
PCT/ EP 00/ 10185

International filing date (day/month/year)  
17/10/2000

Priority date (day/month/year)  
29/10/1999

Applicant  
EXXONMOBIL RESEARCH AND ENGINEERING COMPANY

Title of the invention

1. The applicant is hereby notified that the international application has been accorded the international application number and the international filing date indicated above.
2. The applicant is further notified that the record copy of the international application was transmitted to the International Bureau on the above date of mailing.

3. ☐ Other:

\* The International Bureau monitors the transmittal of the record copy by the receiving Office and will notify the applicant (with Form PCT/IB/301) of its receipt. Should the record copy not have been received by the expiration of 14 months from the priority date, the International Bureau will notify the applicant (Rule 22.1(c)).

Name and mailing address of the receiving Office



European Patent Office, P.B. 5818 Patentlaan 2  
NL-2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Ulrike Staab

# PCT

## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only	
<b>PCT/EP 0 0 / 1 0 1 . 8 5</b>	
International Application No.	
<b>1 8 OCT 2000</b> (18.10.2000)	
International Filing Date	
<b>EUROPEAN PATENT OFFICE</b> <b>PCT INTERNATIONAL APPLICATION</b> Name of receiving Office and "PCT International Application"	
Applicant's or agent's file reference (if desired) (12 characters maximum) <b>P1999S007</b>	

<b>Box No. I TITLE OF INVENTION</b>	
Fuel Oil Compositions With Improved Cold Flow Properties	
<b>Box No. II APPLICANT</b>	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)	
EXXONMOBIL RESEARCH AND ENGINEERING COMPANY (formerly Exxon Research and Engineering Company) 1545 Route 22 East Clinton Township Annandale, New Jersey 08801, United States of America	
<input type="checkbox"/> This person is also inventor.	
Telephone No.	
Facsimile No.	
Teleprinter No.	
State (that is, country) of nationality: US	State (that is, country) of residence: US
This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input checked="" type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box	
<b>Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)</b>	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)	
COCHRANE, Heather D 303 Society Hill, Cherry Hill, New Jersey 08003, United States of America	
This person is: <input type="checkbox"/> applicant only <input checked="" type="checkbox"/> applicant and inventor <input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)	
State (that is, country) of nationality: GB	State (that is, country) of residence: US
This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box	
<input checked="" type="checkbox"/> Further applicants and/or (further) inventors are indicated on a continuation sheet.	
<b>Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE</b>	
The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: <input checked="" type="checkbox"/> agent <input type="checkbox"/> common representative	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)	
DEW, Melvyn John; MARESCHAL, Anne M.; VELDHUIZEN Albert Dirk Willem. ExxonMobil Chemical Europe Inc. P.O. Box 105 B - 1830 MACHELEN BELGIUM	
Telephone No. + 32 2 722 22 24	
Facsimile No. + 32 2 722 22 99	
Teleprinter No.	
<input type="checkbox"/> Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.	

Sheet No. 2

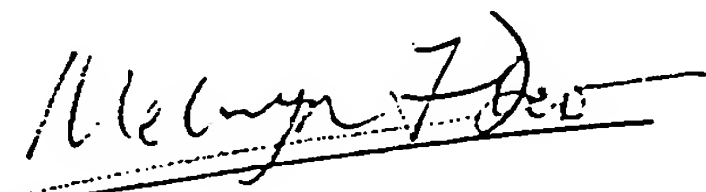
Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)	
<i>If none of the following sub-boxes is used, this sheet should not be included in the request.</i>	
<p>Name and address: <i>(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</i></p> <p>CLOKE-BROWNE, Veronica  Cask House  Hazeley Road  Twyford  Hants SO21 1PT  Great Britain</p>	<p>This person is:</p> <p><input type="checkbox"/> applicant only</p> <p><input checked="" type="checkbox"/> applicant and inventor</p> <p><input type="checkbox"/> inventor only <i>(If this check-box is marked, do not fill in below.)</i></p>
State <i>(that is, country)</i> of nationality: GB	State <i>(that is, country)</i> of residence: GB
<p>This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box</p>	
<p>Name and address: <i>(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</i></p>	<p>This person is:</p> <p><input type="checkbox"/> applicant only</p> <p><input type="checkbox"/> applicant and inventor</p> <p><input type="checkbox"/> inventor only <i>(If this check-box is marked, do not fill in below.)</i></p>
State <i>(that is, country)</i> of nationality:	State <i>(that is, country)</i> of residence:
<p>This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box</p>	
<p>Name and address: <i>(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</i></p>	<p>This person is:</p> <p><input type="checkbox"/> applicant only</p> <p><input type="checkbox"/> applicant and inventor</p> <p><input type="checkbox"/> inventor only <i>(If this check-box is marked, do not fill in below.)</i></p>
State <i>(that is, country)</i> of nationality:	State <i>(that is, country)</i> of residence:
<p>This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box</p>	
<p>Name and address: <i>(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</i></p>	<p>This person is:</p> <p><input type="checkbox"/> applicant only</p> <p><input type="checkbox"/> applicant and inventor</p> <p><input type="checkbox"/> inventor only <i>(If this check-box is marked, do not fill in below.)</i></p>
State <i>(that is, country)</i> of nationality:	State <i>(that is, country)</i> of residence:
<p>This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box</p>	
<p>Name and address: <i>(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)</i></p>	
<p>This person is:</p> <p><input type="checkbox"/> applicant only</p> <p><input type="checkbox"/> applicant and inventor</p> <p><input type="checkbox"/> inventor only <i>(If this check-box is marked, do not fill in below.)</i></p>	
State <i>(that is, country)</i> of nationality:	State <i>(that is, country)</i> of residence:
<p>This person is applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box</p>	
<p><input type="checkbox"/> Further applicants and/or (further) inventors are indicated on another continuation sheet.</p>	



Box No.V	DESIGNATION OF STATES
The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):	
<b>Regional Patent</b>	
<input type="checkbox"/> AP	ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, MZ Mozambique, SD Sudan, SL Sierra Leone, SZ Swaziland, TZ United Republic of Tanzania, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
<input type="checkbox"/> EA	Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
<input checked="" type="checkbox"/> EP	European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
<input type="checkbox"/> OA	OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)
<b>National Patent (if other kind of protection or treatment desired, specify on dotted line):</b>	
<input type="checkbox"/> AE	United Arab Emirates
<input type="checkbox"/> AG	Antigua and Barbuda
<input type="checkbox"/> AL	Albania
<input type="checkbox"/> AM	Armenia
<input type="checkbox"/> AT	Austria
<input type="checkbox"/> AU	Australia
<input type="checkbox"/> AZ	Azerbaijan
<input type="checkbox"/> BA	Bosnia and Herzegovina
<input type="checkbox"/> BB	Barbados
<input type="checkbox"/> BG	Bulgaria
<input type="checkbox"/> BR	Brazil
<input type="checkbox"/> BY	Belarus
<input type="checkbox"/> BZ	Belize
<input checked="" type="checkbox"/> CA	Canada
<input type="checkbox"/> CH and LI	Switzerland and Liechtenstein
<input type="checkbox"/> CN	China
<input type="checkbox"/> CR	Costa Rica
<input type="checkbox"/> CU	Cuba
<input type="checkbox"/> CZ	Czech Republic
<input type="checkbox"/> DE	Germany
<input type="checkbox"/> DK	Denmark
<input type="checkbox"/> DM	Dominica
<input type="checkbox"/> DZ	Algeria
<input type="checkbox"/> EE	Estonia
<input type="checkbox"/> ES	Spain
<input type="checkbox"/> FI	Finland
<input type="checkbox"/> GB	United Kingdom
<input type="checkbox"/> GD	Grenada
<input type="checkbox"/> GE	Georgia
<input type="checkbox"/> GH	Ghana
<input type="checkbox"/> GM	Gambia
<input type="checkbox"/> HR	Croatia
<input type="checkbox"/> HU	Hungary
<input type="checkbox"/> ID	Indonesia
<input type="checkbox"/> IL	Israel
<input type="checkbox"/> IN	India
<input type="checkbox"/> IS	Iceland
<input checked="" type="checkbox"/> JP	Japan
<input type="checkbox"/> KE	Kenya
<input type="checkbox"/> KG	Kyrgyzstan
<input type="checkbox"/> KP	Democratic People's Republic of Korea
<input type="checkbox"/> KR	Republic of Korea
<input type="checkbox"/> KZ	Kazakhstan
<input type="checkbox"/> LC	Saint Lucia
<input type="checkbox"/> LK	Sri Lanka
<input type="checkbox"/> LR	Liberia
<input type="checkbox"/> LS	Lesotho
<input type="checkbox"/> LT	Lithuania
<input type="checkbox"/> LU	Luxembourg
<input type="checkbox"/> LV	Latvia
<input type="checkbox"/> MA	Morocco
<input type="checkbox"/> MD	Republic of Moldova
<input type="checkbox"/> MG	Madagascar
<input type="checkbox"/> MK	The former Yugoslav Republic of Macedonia
<input type="checkbox"/> MN	Mongolia
<input type="checkbox"/> MW	Malawi
<input type="checkbox"/> MX	Mexico
<input type="checkbox"/> MZ	Mozambique
<input type="checkbox"/> NO	Norway
<input type="checkbox"/> NZ	New Zealand
<input type="checkbox"/> PL	Poland
<input type="checkbox"/> PT	Portugal
<input type="checkbox"/> RO	Romania
<input type="checkbox"/> RU	Russian Federation
<input type="checkbox"/> SD	Sudan
<input type="checkbox"/> SE	Sweden
<input checked="" type="checkbox"/> SG	Singapore
<input type="checkbox"/> SI	Slovenia
<input type="checkbox"/> SK	Slovakia
<input type="checkbox"/> SL	Sierra Leone
<input type="checkbox"/> TJ	Tajikistan
<input type="checkbox"/> TM	Turkmenistan
<input type="checkbox"/> TR	Turkey
<input type="checkbox"/> TT	Trinidad and Tobago
<input type="checkbox"/> TZ	United Republic of Tanzania
<input type="checkbox"/> UA	Ukraine
<input type="checkbox"/> UG	Uganda
<input checked="" type="checkbox"/> US	United States of America
<input type="checkbox"/> UZ	Uzbekistan
<input type="checkbox"/> VN	Viet Nam
<input type="checkbox"/> YU	Yugoslavia
<input type="checkbox"/> ZA	South Africa
<input type="checkbox"/> ZW	Zimbabwe
Check-box reserved for designating States which have become party to the PCT after issuance of this sheet:	
<input type="checkbox"/>	
<b>Precautionary Designation Statement:</b> In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)	



Sheet No. 4

<b>Box No. VI PRIORITY CLAIM</b>					<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:			
		national application: country	regional application: regional Office	international application: receiving Office	
item (1) 29 October 1999 (29/10/99)	9925643.0	GB			
item (2)					
item (3)					
<input type="checkbox"/> The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s):					
<small>* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.</small>					
<b>Box No. VII INTERNATIONAL SEARCHING AUTHORITY</b>					
<b>Choice of International Searching Authority (ISA)</b> <small>(if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):</small>		<b>Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):</b> Date (day/month/year)      Number      Country (or regional Office)			
ISA / EP					
<b>Box No. VIII CHECK LIST; LANGUAGE OF FILING</b>					
This international application contains the following number of sheets: request : 4 description (excluding sequence listing part) : 6 claims : 3 abstract : 1 drawings : - sequence listing part of description : - Total number of sheets : 14		This international application is accompanied by the item(s) marked below: 1. <input checked="" type="checkbox"/> fee calculation sheet 2. <input type="checkbox"/> separate signed power of attorney 3. <input checked="" type="checkbox"/> copy of general power of attorney; reference number, if any: 55, 18826 4. <input type="checkbox"/> statement explaining lack of signature 5. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6. <input type="checkbox"/> translation of international application into (language): 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input checked="" type="checkbox"/> other (specify): Acknowledgement of receipt form 1037			
Figure of the drawings which should accompany the abstract:		Language of filing of the international application: English			
<b>Box No. IX SIGNATURE OF APPLICANT OR AGENT</b>					
Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).					
 DEW, Melvyn John, General Authorisation No. 55					

For receiving Office use only		2. Drawings:  <input type="checkbox"/> received: none  <input type="checkbox"/> not received:
1. Date of actual receipt of the purported international application:	(18. 10. 2000)      18 OCT 2000	
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:		
4. Date of timely receipt of the required corrections under PCT Article 11(2):		
5. International Searching Authority (if two or more are competent): ISA /	6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.	

For International Bureau use only
Date of receipt of the record copy by the International Bureau:

1) To KS/NC FOR DE

2) To Bill

Kaabe

23 Feb. 2001

PATENT COOPERATION TREATY

IPSS UPDATED

K. STORMS

28 FEB 2001

RECEIVED IN MACHELEN

23 -02- 2001

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

EXXONMOBIL CHEMICAL EUROPE INC.  
Attn. DEW, Melvyn John  
P.O. Box 105  
B-1830 Machelen  
BELGIUM

NOTIFICATION OF TRANSMITTAL OF  
THE INTERNATIONAL SEARCH REPORT  
OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing  
(day/month/year)

23/02/2001

Applicant's or agent's file reference

P1999S007

FOR FURTHER ACTION

See paragraphs 1 and 4 below

International application No.

PCT/EP 00/10185

International filing date  
(day/month/year)

18/10/2000

Applicant

EXXONMOBIL RESEARCH AND ENGINEERING COMPANY

1. ☒ The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

**Filing of amendments and statement under Article 19:**

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

**When?** The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

**Where?** Directly to the International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland  
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority



European Patent Office, P.B. 5818 Patentlaan 2  
NL-2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Gennaro Cappiello

## NOTE FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

### INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

#### What parts of the International application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

#### When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

#### Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

#### How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

#### What documents must/may accompany the amendments?

##### Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:  
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:  
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:  
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or  
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:  
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

**"Statement under article 19(1)" (Rule 46.4)**

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)".

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

**Consequence if a demand for international preliminary examination has already been filed**

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

**Consequence with regard to translation of the international application for entry into the national phase**

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

# PATENT COOPERATION TREATY

10 -12- 2000

PCT

## NOTIFICATION OF RECEIPT OF RECORD COPY

(PCT Rule 24.2(a))

IPSS UPDATED  
N. CALLENS

From the INTERNATIONAL BUREAU

To:

DEW, Melvyn, John  
ExxonMobil Chemical Europe Inc.  
P.O. Box 105  
B-1830 Machelen  
BELGIQUE

Date of mailing (day/month/year) 27 November 2000 (27.11.00)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference P1999S007	International application No. PCT/EP00/10185

The applicant is hereby notified that the International Bureau has received the record copy of the international application as detailed below.

Name(s) of the applicant(s) and State(s) for which they are applicants:

EXXONMOBIL RESEARCH AND ENGINEERING COMPANY (for all designated States except  
US)

COCHRANE, Heather, D. et al (for US)

International filing date : 17 October 2000 (17.10.00)  
Priority date(s) claimed : 29 October 1999 (29.10.99)  
Date of receipt of the record copy  
by the International Bureau : 17 November 2000 (17.11.00)  
List of designated Offices :

EP : AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE  
National : CA, JP, US

### ATTENTION

The applicant should carefully check the data appearing in this Notification. In case of any discrepancy between these data and the indications in the international application, the applicant should immediately inform the International Bureau.

In addition, the applicant's attention is drawn to the information contained in the Annex, relating to:

- ☒ time limits for entry into the national phase
- ☒ confirmation of precautionary designations
- ☒ requirements regarding priority documents

A copy of this Notification is being sent to the receiving Office and to the International Searching Authority.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer: Peggy Steunenberg
Facsimile No. (41-22) 740.14.35	Telephone No. (41-22) 338.83.38



# PATENT COOPERATION TREATY

RECEIVED IN MACHELEN  
 28 JAN 2002  
 28 JAN 2002

From the  
 INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PC MASTER . UPDATED

IP LAW

To:

DEW, Melvyn John  
 EXXONMOBIL CHEMICAL EUROPE INC.  
 P.O. Box 105  
 B-1830 Machelen  
 BELGIQUE

DOWNSTREAM

28 JAN 2002

N. CALLENS

PCT

NOTIFICATION OF TRANSMITTAL OF  
 THE INTERNATIONAL PRELIMINARY  
 EXAMINATION REPORT  
 (PCT Rule 71.1)

Date of mailing  
 (day/month/year) 24.01.2002

Applicant's or agent's file reference  
 P1999S007

## IMPORTANT NOTIFICATION

International application No.  
 PCT/EP00/10185

International filing date (day/month/year)  
 18/10/2000

Priority date (day/month/year)  
 29/10/1999

Applicant  
 EXXONMOBIL RESEARCH AND ENGINEERING COMPANY et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

### 4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/



European Patent Office  
 D-80298 Munich  
 Tel. +49 89 2399 - 0 Tx: 523656 epmu d  
 Fax: +49 89 2399 - 4465

Authorized officer

Michaleczek, N

Tel. +49 89 2399-7254



# INTERNET COOPERATION TREATY PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>P1999S007</b>	<div style="display: flex; justify-content: space-between;"> <div><b>FOR FURTHER ACTION</b></div> <div>See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)</div> </div>	
International application No. <b>PCT/EP00/10185</b>	International filing date (day/month/year) <b>18/10/2000</b>	Priority date (day/month/year) <b>29/10/1999</b>
International Patent Classification (IPC) or national classification and IPC <b>C10L1/04</b>		
Applicant <b>EXXONMOBIL RESEARCH AND ENGINEERING COMPANY et al.</b>		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand  <b>23/05/2001</b>	Date of completion of this report  <b>24.01.2002</b>
Name and mailing address of the international preliminary examining authority:   <b>European Patent Office</b> <b>D-80298 Munich</b> Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer  <b>Glod, G</b>  Telephone No. +49 89 2399 7373 <div style="text-align: right;">  </div>



# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP00/10185

## I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, pages:**

1-6 as originally filed

**Claims, No.:**

1-13 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP00/10185

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

### 1. Statement

Novelty (N)	Yes:	Claims	1-13
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-13
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-13
	No:	Claims	

### 2. Citations and explanations see separate sheet

## VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:  
see separate sheet

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/EP00/10185

**Re Item V**

**Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. US-A-2 717 858 discloses a composition containing a cracked heating oil boiling in the range from 179°C-345°C and a virgin heating oil boiling in the range from 166°C-348°C (column 5, lines 15-20). The difference between this and the subject matter of independent claim 1 of the application is that no naphtha fraction is mentioned. The subject-matter of independent claim 1 and of dependent claims 2-12 therefore is novel. The subject-matter of independent claim 13, which is a method to prepare a composition according to claim 13, is also novel.
2. The problem to be solved by the present application is to find a fuel oil composition having improved cold-flow properties.  
The problem is solved by a composition according to claim 1 and a method according to claim 13.  
None of the prior art documents mentions that the addition of a naphtha fraction from an atmospheric or a vacuum pipestill having a boiling range of 130°C to 235°C to a fuel composition leads to improved cold-flow properties as shown in the example.  
The subject-matter of independent claims 1 and 13 and dependent claims 2-12 is inventive.
3. The claimed composition is industrially applicable, as it can for instance be used as automotive diesel oil.

**Re Item VIII**

**Certain observations on the international application**

- 4a. The expressions 'relatively light' and 'relatively heavy' used in claims 1 and 13 are vague and unclear and leave the reader in doubt as to the meaning of the technical features to which they refer, thereby rendering the definition of the subject-matter of said claims unclear (Article 6 PCT).
- 4b. The subject-matter of claim 10 is unclear, as said claim refers back to any of the

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/EP00/10185

preceding claims. If one refers back to claim 9, then there are two fractions (d), (e), (f) and (g) present. It is thus unclear whether the fractions disclosed in claim 10 are present in addition to the fractions disclosed in claim 9.

## (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

CORRECTED VERSION

(19) World Intellectual Property Organization  
International Bureau(43) International Publication Date  
10 May 2001 (10.05.2001)

PCT

(10) International Publication Number  
**WO 01/32810 A1**(51) International Patent Classification<sup>7</sup>: C10L 1/04, 1/08[GB/GB]: Cask House, Hazeley Road, Twyford, Hants  
SO21 1PT (GB).

(21) International Application Number: PCT/EP00/10185

(74) Agents: DEW, Melvyn, John et al.: ExxonMobil Chemical Europe Inc., P.O. Box 105, B-1830 Machelen (BE).

(22) International Filing Date: 17 October 2000 (17.10.2000)

(81) Designated States (*national*): CA, JP, SG, US.

(25) Filing Language: English

(84) Designated States (*regional*): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

(26) Publication Language: English

(30) Priority Data:  
9925643.0 29 October 1999 (29.10.1999) GBPublished:  
— with international search report(71) Applicant (*for all designated States except US*): EXXON-MOBIL RESEARCH AND ENGINEERING COMPANY [US/US]: 1545 Route 22 East, Clinton Township, Annandale, NJ 08801 (US).(48) Date of publication of this corrected version:  
23 May 2002(15) Information about Correction:  
see PCT Gazette No. 21/2002 of 23 May 2002, Section II

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): COCHRANE, Heather, D. [GB/US]: 303 Society Hill, Cherry Hill, New Jersey 08003 (US). CLOKE-BROWNE, Veronica

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: FUEL OIL COMPOSITIONS WITH IMPROVED COLD FLOW PROPERTIES

(57) Abstract: This invention relates to a fuel oil composition having improved cold-flow properties and comprising a cold flow additive and streams from various pipestill of a petroleum crude refinery process: a) a relatively heavy fraction from a catalytically cracked heavy gasoil in turn derived from an atmospheric or vacuum pipestill, said fraction having a boiling range of 170 to 380 °C in an amount of 3 to 20 % by weight and b) a gasoil product from an atmospheric pipestill, said product having a boiling range of 225 to 360 °C in an amount of 30-50 % by weight, whereby components (a) and/or (b) is at least partially replaced by at least one relatively light naphtha fraction (c) from the atmospheric or vacuum pipestill, fraction (c) having a boiling range of 130 to 235 °C and being present in an amount of 3 to 20 % by weight.



WO 01/32810 A1

(19) World Intellectual Property Organization  
International Bureau



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(51) International Patent Classification<sup>7</sup>: C10L 1/04, 1/08

(21) International Application Number: PCT/EP00/10185

(22) International Filing Date: 17 October 2000 (17.10.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
9925643.0 29 October 1999 (29.10.1999) GB

(71) Applicant (for all designated States except US): EXXON-MOBIL RESEARCH AND ENGINEERING COMPANY [US/US]; 1545 Route 22 East, Clinton Township, Annandale, NJ 08801 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): COCHRANE,

Heather, D. [GB/US]; 303 Society Hill, Cherry Hill, New Jersey 08003 (US). CLOKE-BROWNE, Veronica [GB/GB]; Cask House, Hazeley Road, Twyford, Hants SO21 1PT (GB).

(74) Agents: DEW, Melvyn, John et al.; ExxonMobil Chemical Europe Inc., P.O. Box 105, B-1830 Machelen (BE).

(81) Designated States (national): CA, JP, US.

(84) Designated States (regional): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published:  
— With international search report.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.



WO 01/32810 A1

(54) Title: FUEL OIL COMPOSITIONS WITH IMPROVED COLD FLOW PROPERTIES

(57) Abstract: This invention relates to a fuel oil composition having improved cold-flow properties and comprising a cold flow additive and streams from various pipestills of a petroleum crude refinery process: a) a relatively heavy fraction from a catalytically cracked heavy gasoil in turn derived from an atmospheric or vacuum pipestill, said fraction having a boiling range of 170 to 380 °C in an amount of 3 to 20 % by weight and b) a gasoil product from an atmospheric pipestill, said product having a boiling range of 225 to 360 °C in an amount of 30-50 % by weight, whereby components (a) and/or (b) is at least partially replaced by at least one relatively light naphtha fraction (c) from the atmospheric or vacuum pipestills, fraction (c) having a boiling range of 130 to 235 °C and being present in an amount of 3 to 20 % by weight.

**FUEL OIL COMPOSITIONS WITH IMPROVED COLD FLOW PROPERTIES**

This invention relates to fuel oil compositions, especially middle distillate fuel oil compositions, with improved flow properties.

It is important that fuel oil compositions, especially middle distillate oil compositions such as automotive diesel oils, heating oils and gas oils (hereafter collectively referred to as "fuel oil" for convenience) retain their flow properties at relatively low temperatures. The main cause of such loss of flow properties is due to the formation of wax which tends to precipitate out and agglomerate thereby plugging burner and vehicle fuel filters and hence impairing flow. The temperature at which the wax starts to appear is termed the cloud point of the fuel. The cold filter plugging point (CFPP) is recognised as a measure of the operability of a fuel and the temperature at which a fuel will start to block vehicle filters. It is generally less than or equal to the cloud point of the fuel. This problem has been well recognized in the art and has hitherto been mitigated by the use of various flow improving additives also known as middle distillate flow improvers (MDFI) which reduce the CFPP of responsive fuels. One such example is Paraflow® 240 (commercially sold by Infineum). The flow improvers can change the size or the shape of the crystals as they precipitate out of the oil at low temperatures thereby allowing them to pass through the vehicle filter easily and avoid blockage of the fuel filter of the vehicle. Either way, it is important that the flow properties of the fuel oils are maintained.

Hitherto, crude oil was refined into motor gasoline, automotive diesel oils (hereafter "ADO") and gas oils used as heating oils (fuel oils) and their respective specifications were such that it was possible to easily treat ADO, gasoil and heating oils. However, recent legislation to minimise the amount of sulphur and also constrain other properties, eg density, in ADOs has meant that some of the heavier components of ADOs, such as e.g. catalytically cracked heating oils, have been displaced into the gasoil and heating oil fractions. These changes in the composition of ADO, gasoils and heating oils may mean that the effectiveness of conventional cold flow improvers such as Paraflow® 240 is lessened.

It is an object of the present invention to improve the flow properties of fuel oils (as herein defined) containing conventional flow improvers by incorporating therein a heavy catalytically-cracked naphtha.



Accordingly, the present invention is a fuel oil composition having improved cold-flow properties, said composition comprising a cold flow additive and the following components from various pipestill of a petroleum crude refinery process:

- 5 a. A relatively heavy fraction from a catalytically cracked heavy gasoil in turn derived from an atmospheric or vacuum pipestill, said fraction having a boiling range of 170 to 380°C in an amount of 3 to 20% by weight and
  - b. A gasoil product from an atmospheric pipestill, said product having a boiling range of 225 to 360°C in an amount of 30-50% by weight,
- 10 characterized in that components (a) and/or (b) in said composition is at least partially replaced by at least one relatively light naphtha fraction (c) from the atmospheric or vacuum pipestill, said light fraction (c) having a boiling range of 130 to 235°C and being present in an amount of 3 to 20% by weight, all weights being based on the total weight of the fuel oil composition.

15

- In the fuel compositions of the present invention, the various components referred to are all derivable from various process streams of a petroleum crude refinery process. Such methods are well known in the art and are described in detail, for instance, by Keith Owen and Trevor Colley in "Automotive Fuels Reference Book", Second Edition,
- 20 published by the Society of Automotive Engineers, Inc, Warrendale, PA, USA (1995). Specifically referred to are Chapter 3 of this text-book at pages 29-49 and Chapter 16 at pages 419-469 and 865-890, the latter pages forming Appendix 12 which is a 'Glossary of Terms' used in this art. Thus, reference to component (a) means a heavy fraction produced by catalytic cracking of heavy gas oil from the atmospheric or vacuum pipestill.
- 25 This fraction suitably has a boiling point in the range from 184 to 376°C. This fraction is suitably present in the compositions of the present in an amount ranging from about 5-18 % by weight of the total fuel oil composition.

- In the fuel oil composition of the present invention, the reference to component
- 30 (b) means a gasoil product from an atmospheric pipestill which suitably has a boiling point in the range from about 244 to 330°C. This product is suitably present in the compositions of the present in an amount ranging from about 35-45% by weight of the total fuel oil composition.

The third essential component in the fuel oil compositions of the present invention is a light naphtha fraction (c) derived by the catalytic cracking of a heavy gasoil from an atmospheric or a vacuum pipestill. This naphtha fraction (c) suitably has a boiling point in the range from 136 to 231°C and preferably component (a) and/or (b) in the fuel composition in an amount from about 5-15% by weight of the total composition. Fraction (c) suitably has an aromatics content in the range from about 60 - 75% by weight.

The fuel oil compositions of the present invention may contain in addition other conventional distillate fractions from a petroleum crude refinery process under atmospheric or vacuum conditions. These include *inter alia* components (d) to (g) described below:

(d) A fraction from a vacuum pipestill which suitably has a boiling point in the range from about 200 to 400°C, preferably from about 240-365°C. This fraction (d) is suitably present in the compositions of the present in an amount ranging from about 3-7% by weight, preferably from about 4-6 % by weight of the total composition.

(e) A fraction from an atmospheric pipestill which suitably has a boiling point in the range from about 160-380°C, preferably from about 183 to 331°C. This fraction (e) is suitably present in the compositions of the present in an amount ranging from about 5 to 15% by weight, preferably from about 9 to 10% by weight, typically about 9.5-10.0% by weight.

(f) A fraction from an atmospheric pipestill which suitably has a boiling point in the range from about 230 -350°C, preferably from about 231 to 344°C. This fraction (f) is suitably present in the compositions of the present in an amount ranging from about 15 to 30% by weight, preferably from about 20-25% by weight.

(g) A fraction from an atmospheric pipestill which suitably has a boiling point in the range from about 210-420°C, preferably from about 216 to 395°C. This fraction is suitably present in the compositions of the present in an amount ranging from about 3 to 8% by weight, preferably from about 4-6 % by weight.

The fuel oil compositions of the present invention having an n-paraffin (C<sub>12+</sub>) content of less than 20% by weight particularly benefit by blending with the light naphtha fraction (c). Such fuel oil compositions suitably have a cloud point of about -3 to -4°C.

The cold flow additive in fuel oil composition is suitably one that is generally available provided it is soluble in the fuel oil composition, although copolymers of

ethylene and at least one other unsaturated monomer which may be an additional mono-olefin or an unsaturated ester such as eg vinyl acetate, vinyl propionate, vinyl butyrate, ethyl acrylate and lauryl methacrylate or the like. The other unsaturated monomer can also be a mixture of an unsaturated mono-ester or diester and a straight chain or branched chain  $\alpha$ -monoolefin. Mixtures of copolymers, such as eg a copolymer of ethylene and vinyl acetate with an alkylated polystyrene or with an acylated polystyrene, can also be used. Where the flow additive is a coolymer, it suitably consists of 1 to 40, preferably 1 to 20 and more preferably 3 to 20 molar proportions of ethylene per molar proportion of the other unsaturated monomer. The additive copolymer is suitably oil-soluble and has a number average molecular weight in the range from about 1,000 to 50,000, preferably about 1,000 to about 5,000. The cold flow additive is preferably an ethylene-vinyl carboxylate copolymer which may be selected from one or more of Paraflow®240, Paraflow® 226, Paraflow® 222, Paraflow® 275, Paraflow® 255, Paraflow® 223, Paraflow® 332, Paraflow® 209, Paraflow® 206, Paraflow® 480, Paraflow® 482, Paraflow® 479 (all ex Infineum), KF 6100S, KF 6100, KF 6301, KF 6101 (ex BASF), and DF 4842 (ex Clariant). Some of these oil-soluble additives which are eg olefin/vinyl carboxylate copolymers having a number average molecular weight as measured by vapour pressure osmometry of 1,000 to 10,000 which may optionally contain polar nitrogen compounds as co-additives, are described in EP-A-261957 and WO 94/00535.

The cold flow additive is suitably present in the oil composition in an amount from about 0.001-2.0% by weight of the total fuel oil composition.

The surprising feature of the present invention is that component (c), which is a relatively light fraction compared to the distribution of heavier components in fuel oils, is able to improve the effectiveness of conventional cold flow improvers in such fuel oils. It has been found that by using an aliquot of component (c) in the fuel oil compositions, it is possible to depress the cloud point and the temperature of operability, the latter as determined by the cold-filter plugging point (hereafter "CFPP") to a significant extent.

The present invention is further illustrated with reference to the following Examples:

**EXAMPLES:**

The following data was generated by subjecting a variety of fuel oils, each of which contained (i) 500 ppm by volume of an ethylene-vinyl acetate copolymer (Paraflow® 240, ex Infineum) cold flow additive and (ii) a 1050 ppm by volume of a gasoil marker dye, to a cold flow plugging point (CFPP) test. The test is described in detail in the text-book by Owen & Coley referred to above at pages 422-426 in Chapter 16.1.5. This is an IP 309 test and is also published as a European Standard by CEN, EN116:1981. Briefly, 40 ml of a sample of the test oil is cooled by a bath maintained at about -34°C. Periodically (at each 1°C drop in temperature starting from not less than 5°C above the cloud point thereof), the cooled oil is tested for its ability to flow through a fine screen in a given time period. This cold flow property is tested with a device consisting of a pipette the lower end of which is attached an inverted funnel positioned below the surface of the test oil. Stretched across the mouth of the funnel is a 350 mesh screen having an area of about 2.90 cm<sup>2</sup> (0.45 in<sup>2</sup>). The periodic tests are each initiated by applying a vacuum to the upper end of the pipette whereby oil is drawn through the screen up into the pipette to a mark indicating 20 ml. The test is repeated with each 1°C drop in temperature until the oil fails to fill the pipette up to that 20 ml mark within 60 seconds. The temperature at which the last filtration commenced is recorded as the CFPP.

**TABLE**

Components	Fuel Composition 1* (Wt %)	Fuel Composition 2 (Wt %)	Fuel Composition 3 (Wt %)
Component (g)	4.9	4.9	4.9
Component (e)	9.9	9.9	9.9
Component (a)	16.2	8.4	5.0
Component (c)	-	7.8	15.0
Component (b)	42.2	42.2	38.4
Component (f)	21.8	21.8	21.8
Component (d)	5.0	5.0	5.0
<b>Total</b>	100	100	100
Cloud point (°C)	-3	-4	-4
CFPP (°C)	-8	-10	-15

The above results show that partially replacing some of the conventional gas oil components in fuel oils with light naphtha fraction from the catalytic cracking of heavy gasoil clearly improves the CFPP of the fuel oils to a significant extent.

## We Claim:

1. A fuel oil composition having improved cold-flow properties, said composition comprising a cold flow additive and the following components from various pipestill of a petroleum crude refinery process:
  - a. a relatively heavy fraction from a catalytically cracked heavy gasoil in turn derived from an atmospheric or a vacuum pipestill, said fraction having a boiling range of 170 to 380°C in an amount of 3 to 20% by weight and
  - b. a gasoil product from an atmospheric pipestill, said product having a boiling range of 225 to 335°C in an amount of 30-50% by weight,characterized in that components (a) and/or (b) in said composition is at least partially replaced by at least one relatively light naphtha fraction (c) from an atmospheric or a vacuum pipestill, said light fraction (c) having a boiling range of 130 to 235°C and being present in an amount of 3 to 20% by weight, all weights being based on the total weight of the fuel oil composition.
2. A composition according to Claim 1 wherein component (a) has a boiling point in the range from 184 to 376°C.
3. A composition according to Claim 1 or 2 wherein component (a) is present in the composition in an amount ranging from about 5-18 % by weight of the total fuel oil composition.
4. A composition according to any one of the preceding Claims wherein component (b) has a boiling point in the range from about 244 to 330°C.
5. A composition according to any one of the preceding Claims wherein component (b) is present in the composition in an amount ranging from about 35-45% by weight of the total fuel oil composition.
6. A composition according to any one of the preceding Claims wherein the light naphtha fraction (c) has a boiling point in the range from 136 to 231°C.

7. A composition according to any one of the preceding Claims wherein the light naphtha fraction (c) is present in the composition in an amount from about 5-15% by weight of the total composition.
- 5 8. A composition according to any one of the preceding Claims wherein the light naphtha fraction has an aromatics content in the range from about 60 - 75% by weight.
9. A composition according to any one of the preceding Claims wherein the fuel oil composition contains in addition one or more distillate fractions selected from
- 10 (d) a fraction from a vacuum pipestill has a boiling point in the range from about 200 to 400°C and is present in an amount ranging from about 3-7% by weight;
- 15 (e) a fraction from an atmospheric pipestill which has a boiling point in the range from about 160 to 380°C and is present in an amount ranging from about 5 to 15% by weight;
- (f) a fraction from an atmospheric pipestill which has a boiling point in the range from about 230 to 350°C and is present in an amount ranging from about 15 to 30% by weight; and
- 20 (g) a fraction from an atmospheric pipestill which has a boiling point in the range from about 210 to 420°C and is present in an amount ranging from about 3 to 8% by weight,
- all weights being based on the total weight of the fuel oil composition.
- 25 10. A composition according to any one of the preceding Claims wherein the fuel oil composition contains in addition one or more distillate fractions selected from
- (d) a fraction from a vacuum pipestill has a boiling point in the range from about 240 to 365°C and is present in an amount ranging from about 3-7% by weight;
- 30 (e) a fraction from an atmospheric pipestill which has a boiling point in the range from about 183 to 331°C and is present in an amount ranging from about 5 to 15% by weight;
- (f) a fraction from an atmospheric pipestill which has a boiling point in the range from about 231 to 344°C and is present in an amount ranging from about 15 to 30% by weight; and
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(g) a fraction from an atmospheric pipestill which has a boiling point in the range from about 216 to 395°C and is present in an amount ranging from about 3 to 8% by weight,  
all weights being based on the total weight of the fuel oil composition.

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11. A composition according to any one of the preceding Claims wherein the cold flow additive is present in said composition in an amount from 0.001 to 2.0% by weight of the total fuel oil composition.

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12. A composition according to any one of the preceding Claims wherein the cold-flow additive is an ethylene vinyl acetate copolymer.

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13. A method of improving the cold flow properties of a fuel oil composition comprising a cold flow additive and the following components from various pipestill of a petroleum crude refinery process:

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- a. a relatively heavy fraction from a catalytically cracked heavy gasoil in turn derived from an atmospheric or vacuum pipestill, said fraction having a boiling range of 180 to 380°C in an amount of 3 to 20% by weight and
- b. a gasoil product from an atmospheric pipestill, said product having a boiling range of 240 to 335°C in an amount of 30-50% by weight,

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said method comprising replacing at least partially components (a) and/or (b) in said composition by at least one relatively light naphtha fraction (c) from an atmospheric or a vacuum pipestill, said light fraction (c) having a boiling range of 130 to 235°C and being present in an amount of 3 to 20% by weight, all weights being based on the total weight of the fuel oil composition.

# INTERNATIONAL SEARCH REPORT

In Application No  
PCT/EP 00/10185

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 C10L1/04 C10L1/08

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 C10L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2 892 769 A (FRAZIER ET AL) 30 June 1959 (1959-06-30) claims 1-4	1-5
A	US 2 717 858 A (BRONSON ET AL) 13 September 1955 (1955-09-13) claim 5 example I	1,2,4

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*G\* document member of the same patent family

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INTERNATIONAL SEARCH REPORT

Information on patent family members

In International Application No  
PCT/US 00/10185

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2892769	A	30-06-1959	NONE	
US 2717858	A	13-09-1955	NONE	